CASE REPORT
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FABRICATION OF A RIGHT-INDWELLING OCULAR PROSTHESIS IN AN INDIAN PATIENT: A CASE REPORT

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ABSTRACT

Ocular defects caused by trauma, anomalies, or surgery significantly affect vision and appearance, and indwelling ocular prostheses offer long-term cosmetic and psychological rehabilitation by restoring facial symmetry and self-esteem. This case report details the fabrication of a custom right indwelling ocular prosthesis for an Indian patient post-enucleation, emphasizing personalized rehabilitation using locally available materials and techniques within a resource-limited setting. A 43-year-old Male with a history of right eye enucleation due to retinoblastoma presented for replacement of a six-year-old ocular prosthesis that no longer fit satisfactorily, despite previously being well-tolerated without complications. The patient, having worn an ocular prosthesis for nearly six years, opted for anatomical retention over peg implant retention after a thorough discussion of treatment options, visual assessment of the anophthalmic socket, explanation of the multi-step procedure, and provision of informed consent. The patient's previous ocular prosthesis guided the selection of an appropriate impression tray, after which a detailed impression of the eye socket was taken using alginate, duplicated in silicone putty, and used to fabricate a wax scleral pattern that simulated the companion eye. The ocular prosthesis was fabricated using the reverse curing method for acrylic resin, followed by meticulous trimming, coloration with custom pigments and red wool for vascular simulation, and finalized with a second heat cure using clear PMMA to replicate corneal translucency and ensure accurate aesthetic matching with the natural eye. The finished ocular prosthesis was delivered and fitted to the patient, who expressed satisfaction with its comfort and aesthetics, received hygiene and handling instructions, and was placed on a structured follow-up schedule to monitor adaptation and address any issues. This case demonstrates that with patient-centered planning and available materials, a custom ocular prosthesis can provide durable, cost-effective, and psychologically beneficial rehabilitation in resource-limited settings.

KEYWORDS:
Fabrication, Right, Indwelling, Ocular, Prosthesis and Patient.

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INTRODUCTION

Ocular defects resulting from trauma, congenital anomalies, or surgical removal due to disease not only impair vision but also have significant psychological and aesthetic implications for affected individuals [1]. In such cases, the rehabilitation of orbital deformities with an ocular prosthesis plays a vital role in restoring facial symmetry, enhancing self-esteem, and improving

social reintegration [2]. An indwelling ocular prosthesis, in particular, is designed to remain in the ocular socket for extended periods, offering both cosmetic and functional advantages over removable types [3].

This case report presents the clinical and laboratory procedures involved in the fabrication of a custom right indwelling ocular prosthesis for an Indian patient who had undergone enucleation. It highlights the significance of individualized prosthetic rehabilitation tailored to the patient's anatomical and cultural context [4,5]. The use of locally available materials and skilled prosthodontic techniques not only underscores the potential for quality care within resource-limited settings but also contributes to the growing body of literature on maxillofacial prosthetics in Sub-Saharan Africa.

Case Presentation

A 43-year-old male patient was presented to the Maxillofacial Rehabilitation Prosthetics Unit, Pune Medical College Azam campus, India with a defect in his right eye (Fig.1). History revealed that the patient was diagnosed with retina blastoma of the right eye which was enucleated in November 2012. A conformer was fitted at the time of surgery which preserves the conjuntival fornices and also avoids scar tissue from tightening of muscle of the eye.[6-8] A custom made ocular prosthesis was fabricated and fitted, when the tissue had been completely healed .[9,10] Patient wore the ocular prosthesis for nearly 6 years with no inflammation and discharge. The patient needs a new ocular prosthesis as the previous prosthesis does not satisfactorily fits the socket.

Fig 1: Patient's view of the defect eye

Treatment plans

Options for treatment were discussed with the patient and this includes Peg implant retention and anatomical retention. The patient opted for ocular prosthesis by anatomical retention because the patient had been wearing an ocular prosthesis for close to 6 years. Visual assessment of the Anophthalmic socket was undertaken prior to impression taking. This was undertaken to check if the patient was experiencing pain, having any discharge as well as inflammation. The treatment procedures were described to the patient as it requires number of steps in fabrication of ocular prosthesis. An informed consent was obtained from the patient before commencing any treatment.

Selection of impression trays/ impression taking.

The patient's previous ocular prosthesis was used as a guide to select the accurate size of the impression tray, irreversible hydrocolloid Alginate Impression material (Beyzen, Shanghai, China) was used to take impression of the eye socket. This was mixed to a creamy runny consistency to permit easy flow to the socket. The impression was injected using a monojet syringe, (Fig. 3) allowed to set and then withdrawn from the eye socket. The impression was duplicated in silicone putty, carefully not to distort the Alginate Impression material during molding, after setting it was carefully cut into 2 equal halves. This was undertaken to retrieve the impression from the mold. On re-assembling the two equal halves, the molten scleral wax was poured slowly into the mold at 75 degrees Celsiusto minimize shrinkage on cooling. Wax pattern was removed from the mold and excess were trimmed off, and smoothened to give simulation of the companion eye.

Fig 2: Impression taking

Try in was done to check for the following;

- Fitting of the scleral wax pattern to the eye socket,
- Comfort, size and retention [11]
- to check if the form of the corneal prominence matches that of the companion eye
- Movement of eye was observed, thus ensuring no space at the inner cantus.
- Ensure that wax does not fall from eye socket[6] and patient was happy about the fitting of the wax pattern (Fig.3).

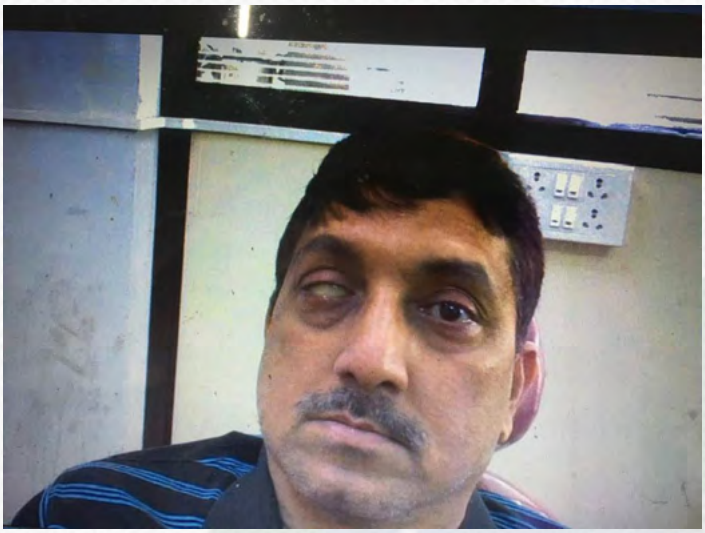

Fig 3: First try –in of the wax pattern

Selection of Pupil

This was completed by using patient's previous ocular prosthesis as it would serve as a guide, the pupil was compared to natural companion eye, and Iris- pupil unit should be 1mm smaller than contra lateral eye. This allow for the magnification of the lens. Special Instrument was used to mark the exact position of iris – pupil unit and the average positioning is 5mm from the inner canthus and 7mm below the inferior boarder of the wax pattern, the iris-pupils unit was embedded and sealed in the wax, smoothened and was ready for the second try-in (Fig. 4).

Fig 4: Smoothening of wax pattern prior the second try in

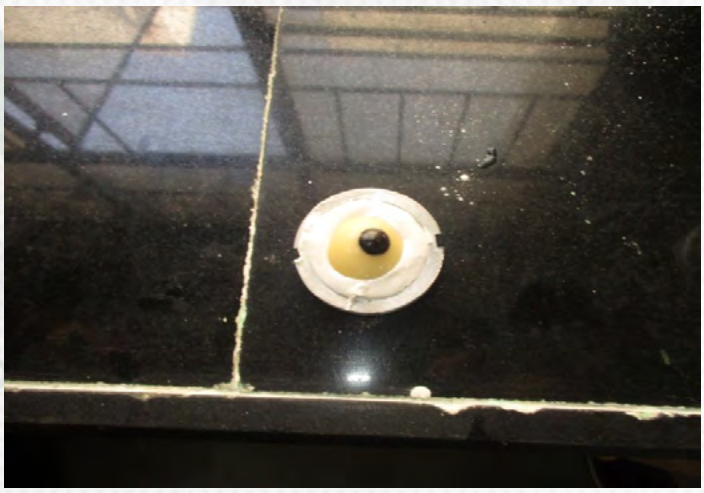

Fig 5: Invested wax pattern

During the second try in, patient was asked to look at a fixed point to ascertain correct position.. After establishing the natural gaze of the patient, the iris unit was reduced with aid of trimming machine and the wax pattern was invested in a small flask (Fig.5).

The wax was eliminated from mould, and a layer of Unifol was applied as separating media, air dry and packed with appropriate colour of the heat cure Polymethyl Meta cry late Resin. Before packing the appropriate colour of characterized Polymethymethacrylate, the iris unit was removed from the mould and small amount of scleral Polymethymethacrylate was placed on the face of the iris and then replaced back into the original mould .

Processing of the wax pattern / Deflasking
The curing method for acrylic resin was used and allowed to bench cool before deflasking.

During deflasking of the processed ocular prosthesis, excess of resin was removed and then the scleral white which covers the corneal unit was trimmed back exposing the actual diameter of iris to match that of the natural contral eye for the magnifying effect. However, the reduction of frontal aspect of the eye gives room for the second curing of the clear lens.

Colouring
Different colours were used depending on the colour of the patient; monopoly and monomer were also used (Fig.6).The iris-pupil unit was painted first with aid of natural light and checked against the patient to check for the actual colour of the patient (Fig.7). Pigmented coats of paints were applied to ascertain the actual colour of the patient. Strands of red wool were sealed using clear vanish to simulate the blood vessels.[6]

A layer of Unifol was applied as separating media, air dry and the characterized prosthesis was re-inserted back into the mould and packed with clear

Fig 6: Painting apparatus

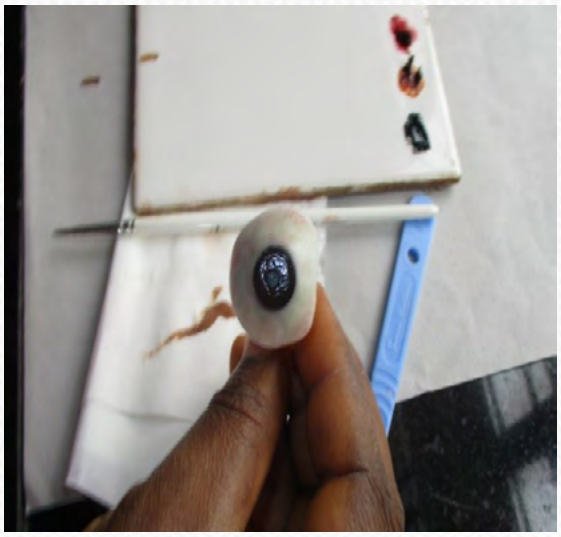

Fig 7: Painted eye checked against patient's natural eye

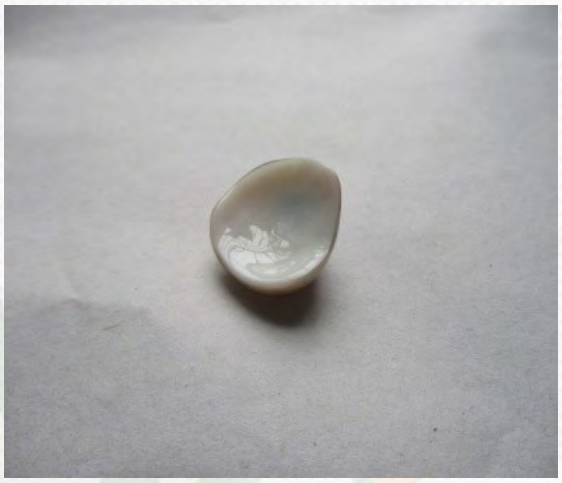

Fig 8: Fitting surface of the eye prosthesis.

The prosthesis was processed for second time using a reverse curing cycle; it was deflasked, trimmed. The prosthesis was polished to give a high gloss ensuring no nodules on the fitting surface and high surface shine was also obtain by using polishing block compound (Fig. 8 & 9). This was undertaken to avoid irritation of the socket.

Fig 9: polishing surface of the eye prosthesis

Fig 10: Frontal view of the patient

Delivery and Care of the prosthesis

The finished eye prosthesis was fitted in the patient's eye socket, appearance, aesthetics and comfort of the patient were assessed. Patient was happy and he was also instructed on how to insert and remove the ocular prosthesis and to maintain hygiene by washing his hands before and after insertion of the ocular prosthesis. [13]

Follow up

Patient was given appointment for a day after delivery of the ocular prosthesis to check if there were any challenges the patient expresses his satisfaction over his new ocular prosthesis as the previous prosthesis does not satisfactorily fit the socket.

Patient was reviewed monthly for three months, then visit were arranged to be every 3 months.
The finished eye prosthesis was delivered to the patient Esthetics and comfort of the patient were assessed the patient was instructed on how to insert and remove the prosthesis.[12] Patient was given a mirror to check for fitting and he was satisfied (Fig.10 &11).

Fig 11: Patient's side view of the fitted eye prosthesis.

Discussion

This case report presents a patient that lost his right eye on the account of retina blastoma which was enucleated. There are two methods employed in fitting as well as fabricating of ocular prosthesis, either by use of stock eye or custom made ocular prosthesis. The disadvantage of the stock eye is that the aesthetics is compromised because the colour of the sclera and the iris unit do not mimic the contra lateral natural eye. The laboratory procedure involved in the fabrication of ocular prosthesis ensures good fit of the artificial eye and a good natural esthetic outcome. The application of reverse curing cycle guarantees the removal of residual monomer, curing at an elevated temperature compared to other documented procedure.[14] Jorge et al. have shown the advantages of using reverse curing procedure involve in the denture fabrication. The ocular prosthesis is a smaller prosthesis and will be processed with minimal free monomer.[15] Following the delivery of the prosthesis there are some things that need to be taken into consideration when the prosthesis will be remade in the patients' next visit. The correct size of the iris unit from 11.5mm to 11mm unit would be used to simulate the natural companion eye.

Conclusion

The ocular prosthesis though not functional, restores patient's self-esteem, comfort, and prevent social stigma.

List of abbreviations

PMMA: Poly methyl methacrylate

Declarations

We, the undersigned authors, confirm that we have all made significant contributions to the conception, design, execution, and/or interpretation of the reported study. We have read and approved the final version of the manuscript. We confirm that the requirements for authorship have been met and that the manuscript represents honest work.

Ethics approval and consent to participate

Not Applicable

Consent for publication

Written informed consent was obtained from the patient for the publication of this case report and any accompanying images. A copy of the signed

consent form is available from the corresponding author upon reasonable request.

Availability of data and materials
All data generated or analyzed during this study are included in this published article

Competing Interests
There are no conflicts of interest

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Authors' contributions
CAV and NID, handled the study design, collected and analyzed the data, and wrote or revised important parts of the manuscript.
OSC handled the drafting and revising the manuscript critically.
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